Exemption No. 11150

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, DC 20591

In the matter of the petition of **AEROCINE, LLC** for an exemption from part 21; §§ 45.23(b); 61.113(a) and (b); 91.7(a); 91.9(b)(2); 91.103(b); 91.109; 91.119; 91.121; 91.151(a) 91.203(a) and (b); 91.405(a); 91.407(a)(1); 91.409(a)(2); and 91.417(a) and (b) of Title 14, Code of Federal Regulations	**Regulatory Docket No. FAA-2014-0400**

GRANT OF EXEMPTION

By letter dated June 16, 2014, Frank M. Esposito, Esq.,[1] former counsel for AeroCine, now represented by Brian Streem, AeroCine LLC, 405 Douglass St., Suite 2, Brooklyn, NY 11217, petitioned the Federal Aviation Administration (FAA) on behalf of AeroCine, LLC, a New York Limited Liability Company doing business as AeroCine for an exemption from part 21, §§ 45.23(b), 61.113(a) and (b), 91.7(a), 91.9(b)(2), 91.103(b), 91.109, 91.119, 91.121, 91.151(a), 91.203(a) and (b), 91.405(a), 91.407(a)(1), 91.409(a)(2), and 91.417(a) and (b) of Title 14, Code of Federal Regulations (14 CFR). The petition requested an exemption to allow operation of unmanned aircraft systems (UAS) for the purpose of capturing high definition feature film quality aerial cinematography.

The petitioner requests relief from the following regulations:

Part 21 prescribes, in pertinent part, the procedural requirements for issuing and changing design approvals, production approvals, airworthiness certificates, and airworthiness approvals.

Section 45.23(b) prescribes, in pertinent part, that when marks include only the Roman capital letter "N" and the registration number is displayed on limited, restricted or light-sport

[1] On September 17, 2014 Mr. Brian Streem, notified the FAA that Mr. Frank M. Esposito is no longer representing AeroCine.

category aircraft or experimental or provisionally certificated aircraft, the operator must also display on that aircraft near each entrance to the cabin, cockpit, or pilot station, in letters not less than 2 inches nor more than 6 inches high, the words “limited,” “restricted,” “light-sport,” “experimental,” or “provisional,” as applicable.

Section 61.113(a) and (b) prescribes that—

(a) no person who holds a private pilot certificate may act as a pilot in command of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as pilot in command of an aircraft.

(b) a private pilot may, for compensation or hire, act as pilot in command of an aircraft in connection with any business or employment if:

(1) The flight is only incidental to that business or employment; and

(2) The aircraft does not carry passengers or property for compensation or hire.

Section 91.7(a) prescribes, in pertinent part, that no person may operate a civil aircraft unless it is in an airworthy condition.

Section 91.9(b)(2) prohibits operation of U.S.-registered civil aircraft unless there is available in the aircraft a current approved Airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof.

Section 91.103 prescribes, in pertinent part, that each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight, to include—

(a) For a flight under IFR or a flight not in the vicinity of an airport, weather reports and forecasts, fuel requirements, alternatives available if the planned flight cannot be completed, and any known traffic delays of which the pilot in command has been advised by Air Traffic Control (ATC);

(b) For any flight, runway lengths at airports of intended use, and the following takeoff and landing distance information:

(1) For civil aircraft for which an approved Airplane or Rotorcraft Flight Manual containing takeoff and landing distance data is required, the takeoff and landing distance data contained therein; and

(2) For civil aircraft other than those specified in paragraph (b)(1) of this section, other reliable information appropriate to the aircraft, relating to aircraft performance under expected values of airport elevation and runway slope, aircraft gross weight, and wind and temperature.

Section 91.109 prescribes, in pertinent part, that no person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functioning dual controls.

Section 91.119 prescribes that, except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

(a) Anywhere. An altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.

(b) Over congested areas. Over any congested area of a city, town, or settlement, or over any open air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

(c) Over other than congested areas. An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

(d) Helicopters, powered parachutes, and weight-shift-control aircraft. If the operation is conducted without hazard to persons or property on the surface—

(1) A helicopter may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section, provided each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA; and

(2) A powered parachute or weight-shift-control aircraft may be operated at less than the minimums prescribed in paragraph (c) of this section.

Section 91.121 requires, in pertinent part, each person operating an aircraft to maintain cruising altitude by reference to an altimeter that is set "to the elevation of the departure airport or an appropriate altimeter setting available before departure."

Section 91.151(a) prescribes that no person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed, (1) during the day, to fly after that for at least 30 minutes; or (2) At night, to fly after that for at least 45 minutes.

Section 91.203(a) prohibits, in pertinent part, any person from operating a civil aircraft unless it has within it (1) an appropriate and current airworthiness certificate; and (2) an effective U.S. registration certificate issued to its owner or, for operation within the United States, the second copy of the Aircraft Registration Application as provided for in § 47.31(c).

Section 91.203(b) prescribes, in pertinent part, that no person may operate a civil aircraft

unless the airworthiness certificate or a special flight authorization issued under § 91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

Section 91.405(a) requires, in pertinent part, that an aircraft operator or owner shall have that aircraft inspected as prescribed in subpart E of the same part and shall, between required inspections, except as provided in paragraph (c) of the same section, have discrepancies repaired as prescribed in part 43 of the chapter.

Section 91.407(a)(1) prohibits, in pertinent part, any person from operating an aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless it has been approved for return to service by a person authorized under § 43.7 of the same chapter.

Section 91.409(a)(2) prescribes, in pertinent part, that no person may operate an aircraft unless, within the preceding 12 calendar months, it has had an inspection for the issuance of an airworthiness certificate in accordance with part 21 of this chapter.

Section 91.417(a) and (b) prescribes, in pertinent part, that—

(a) Each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:

(1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—

(i) A description (or reference to data acceptable to the Administrator) of the work performed; and\

(ii) The date of completion of the work performed; and

(iii) The signature, and certificate number of the person approving the aircraft for return to service.

(2) Records containing the following information:

(i) The total time in service of the airframe, each engine, each propeller, and each rotor.

(ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.

(iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.

(iv) The current inspection status of the aircraft, including the time since the last

inspection required by the inspection program under which the aircraft and its appliances are maintained.

(v) The current status of applicable airworthiness directives (AD) and safety directives including, for each, the method of compliance, the AD or safety directive number and revision date. If the AD or safety directive involves recurring action, the time and date when the next action is required.

(vi) Copies of the forms prescribed by § 43.9(d) of this chapter for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances.

(b) The owner or operator shall retain the following records for the periods prescribed:

(1) The records specified in paragraph (a)(1) of this section shall be retained until the work is repeated or superseded by other work or for 1 year after the work is performed.

(2) The records specified in paragraph (a)(2) of this section shall be retained and transferred with the aircraft at the time the aircraft is sold.

(3) A list of defects furnished to a registered owner or operator under § 43.11 of this chapter shall be retained until the defects are repaired and the aircraft is approved for return to service.

The petitioner supports its request with the following information:

The petition and the following supporting documentation are hereinafter referred to as the operating documents:

1) AeroCine Technical Manual v2
2) AeroCine General Operations Manual v 10.7.2014
3) AeroCine Battery Safety Manual
4) KW X12 Inspection Checklist
5) Maintenance Log

The petitioner submitted additional information in response to FAA requests, which are posted to the docket. The FAA has organized the petitioner's information into four sections: 1) the unmanned aircraft system (UAS), 2) the UAS pilot in command (PIC), 3) the UAS operating parameters, and 4) the public interest.

Unmanned Aircraft System

The UAS proposed by the petitioner is a Kopterworx, Model Hammer X12, and incorporates a DJI WooKong-M flight control system and associated motors, propellers and electronic speed

controls from various suppliers. This aircraft has twelve counter-rotating propellers and twelve motors in a hexacopter configuration (X12). The petitioner states that given the size, weight, speed, and limited operating area associated with the aircraft to be utilized by the applicant, an exemption from 14 CFR part 21, Subpart H (Airworthiness Certificates), subject to certain conditions and limitations, is warranted and meets the requirements for an equivalent level of safety under 14 CFR part 11 and Section 333 of the FAA Modernization and Reform Act of 2012 (PL 112-95). The petitioner further states that UAS operated without an airworthiness certificate in the restricted environment and under the conditions and limitations proposed by the petitioner will be at least as safe, or safer, than a conventional aircraft (fixed wing or rotorcraft) operating with an airworthiness certificate issued under 14 CFR part 21, Subpart H and not subject to the proposed conditions and limitations.

The petitioner states that the unmanned aircraft (UA) to be operated under this request is less than 55 lbs. fully loaded, flies at a speed of no more than 50 knots, carries neither a pilot nor passenger, carries no explosive materials or flammable liquid fuels, and operates exclusively within a secured area as set out in the petition. In addition, the petitioner has integrated safety features into the design of the UAS, as described in the petition, to ensure the safety of persons and property within and surrounding the limited operating area. The petitioner further describes that, in the event the UAS loses communications with the ground control station, it will rely on a global positioning system (GPS) flight mode and revert to a hover and slowly land.

The petitioner states that even though its UAS will have no airworthiness certificate, an exemption may be needed from 14 CFR § 45.23 as the UA will have no entrance to the cabin, cockpit, or pilot station on which the word "experimental" can be placed. Given the size of the UA, the petitioner notes that the two-inch lettering will be impossible. The petitioner asserts that an equivalent level of safety will be provided by having the UA marked with the word "experimental" on the fuselage in compliance with 14 CFR § 45.29(f), in a location where the pilot, technician, spotter, and others working with the UA will see the markings

The petitioner requests an exemption from the maintenance, preventative maintenance, and alterations requirements in part 91, Subpart E (§§ 91.405 through 91.417). The Director of Operations is responsible for the maintenance control system. The petitioner's operating documents contain preflight, postflight, and periodic maintenance processes to repair discrepancies between inspections for the UAS affected by this exemption.

UAS Pilot In Command (PIC)

The petitioner asserts that since the UA will not carry a pilot or passengers on board, the proposed operations will achieve an equivalent level of safety when conducted by the petitioner's personnel that meet the requirements of its own vetting system, which it stipulates will ensure only pilots of sufficient skill will operate the UAS. Thus, the petitioner believes its pilots will provide a level of safety equal to the same operations conducted by pilots possessing a private pilot certificate. In support of its position, the petitioner argues that while it sees some value in the items taught in a private pilot ground school, there is no correlation between fixed manned aircraft flying skills and flying a UAS, and that the risks attendant to the operation of their UAS are far less than the risk levels inherent in the commercial activities outlined in 14 CFR part 61. The petition further

states that currently, similar lightweight, remote controlled, UAS are legally operating by amateurs with no flight experience, no safety plan and with no controls in place to prevent catastrophe and therefore it is only logical to allow the petitioner's experienced remote control pilots, technicians, and safety crew to operate similar lightweight UAS.

Additionally, the petitioner states that the aircraft will only be operated in quarantined areas that are strictly controlled and are away from airports and populated areas. The petitioner further states that it conducts extensive briefings prior to flight, during which safety carries primary importance, it obtains all necessary permissions and permits prior to operation, and has procedures in place to abort flights in the event of safety breaches or potential danger. The petitioner notes that helicopters are the primary means of aerial motion picture capture and while the safety record of such operations is astounding, it is far safer to operate a battery powered, lightweight UAS. The potential loss of life is diminished because UAS carry no people on board and the petitioner only operates them in specific areas away from mass populations. There is also no fuel on board a UAS and thus the potential for fire or explosions is greatly diminished.

UAS Operating Parameters

The petitioner states that each flight will be staffed with a pilot, technician and spotter; all flights will be operated within visual line of sight (VLOS) of the pilot and UA flights will be limited to a maximum altitude of 400 feet above ground level (AGL). Additionally, the petitioner states it will operate their UAS during filming operations within tightly controlled and limited areas that will be marked and cordoned off, with controls in place to allow for safe operations in accordance with their operating documents. The petitioner argues that compared to flight operations with aircraft or rotorcraft weighing far more than its UA and the lack of flammable fuel, any risk associated with its UAS operations is far less than those with conventional aircraft conducting similar operations. Further, the petitioner utilizes a safety management system to ensure consistent, safe UAS operations.

Regarding 14 CFR § 91.7(a) the petitioner discusses that this regulation prohibits the operation of an aircraft without an airworthiness certificate. The petitioner then states that since no such certificate will be applicable in the form contemplated by the FARs, this regulation is inapplicable.

Regarding 14 CFR § 91.9(b)(2) the petitioner discusses that this regulation requires an aircraft flight manual in the aircraft. The petitioner then states that there are no pilots or passengers, and given the size of the UAS, this regulation is inapplicable. An equivalent level of safety will be achieved by maintaining a manual at the flight operations center.

With respect to preflight actions, the petitioner notes it may need an exemption from 14 CFR § 91.103, because it will not have approved rotorcraft flight manuals. The petitioner asserts that an equivalent level of safety will be achieved by the PIC taking all preflight actions as set forth in their operating documents. Additionally, the petitioner states that a briefing will be conducted prior to each day's filming regarding planned UAS operations, and all personnel performing duties within the boundaries of the safety perimeter will be required to attend.

Although the petition requests relief from 14 CFR § 91.109, it did not include supporting rationale or basis for such relief.

With respect to minimum safe altitudes, the petitioner requested relief from 14 CFR § 91.119, because the petitioner's UAS will never operate above 400 feet AGL, in areas that are cordoned off with security parameters and in accordance with the close range aerial procedures contained in their operating documents.

With respect to 14 CFR § 91.121 the petitioner states that their UAS utilizes electronic global positioning systems and six internal gyroscopes to provide spatial coordination.

With respect to the fuel requirements in14 CFR § 91.151, the petitioner argues that given the limitations on the UA's proposed flight area and the controlled nature of the area in which operations will occur an equivalent level of safety can be achieved by stating their intention to land with 25% battery power remaining.

Public Interest

The petitioner asserts that its petition is in the public interest for several reasons. First, Congress pronounced that it is in the public's interest to integrate commercially flown UAS into the national airspace system (NAS), hence the passing of the Reform Act. Second, the flight data, visual inspections, recorded observations and flight analyses from these operations will be compiled to further enhance its current safety protocols. Third, the public has an interest in reducing the danger and emission associated with current aerial cinematic capture methods, namely full size helicopters. The petitioner notes that its UAS is battery powered and creates no emissions. If the petitioner's UAS crashes there is no fuel to ignite and explode. The impact of the petitioner's lightweight UAS is far less than a full size helicopter, notwithstanding the statistically noteworthy safety record of full size helicopters used in motion picture capture. The public's interest is furthered by minimizing ecological and crash impacts by permitting motion picture capture through the use of lightweight UAS.

The petition states that the progression of the arts and sciences has been fundamental to our society. Permitting the petitioner to immediately fly within the United States furthers these goals. Whether it is the amalgam of scientific discoveries applicable to feature film making (including those drawing upon architecture, physics, engineering and cultural inclusiveness) to advancements in publicly usable technologies or advancements in equipment available to law enforcement personnel/first responders that does not cost millions of dollars, granting the petitioner's exemption request substantially furthers the public's interest in ways known and currently unknown.

Discussion of Public Comments:

A summary of the petition was published in the Federal Register on July 23, 2014 (79 FR 42868). Three comments were received.

Of the three comments received, including two from associations, one comment supported the

exemption request and two opposed. The petition received comments on the following topics: economic impact, UAS, PIC requirements, operational capabilities, airspace, sense and avoid, and data link.

In support of the petitioner's request, the Small UAV Coalition pointed to various safety aspects of the petitioners proposed operation. The Small UAV Coalition noted that the language in Section 333 provides a high degree of regulatory flexibility relative to considering many UAS operations, such as operating closer to persons and property on the surface. Supporting comments also cited the economic benefits of UAS.

The Air Line Pilots Association, International (ALPA) opposed the petition. ALPA noted that the proposed operations will be for "compensation or hire," and believes the UAS pilot must hold at least a current FAA Commercial Pilot Certificate with an appropriate category and class rating for the type of aircraft being flown and a current second-class airman medical certificate. ALPA also noted that this is the requirement for compensation or hire operations in the NAS today. The FAA has carefully reviewed the concerns expressed in these comments regarding knowledge, training, and medical certification required by holders of both private and commercial certificates. Additional details are available in the ensuing analysis of this issue with regards to 14 CFR part 61.

ALPA notes that without specific distances to be maintained from either airports or populated areas, it is impossible to assess the risk that the petitioner may be introducing to other aircraft or to persons on the ground. Without such specificity, it cannot be determined if the proposed operation may place small UAS in the same airspace as manned aircraft operating in an ATA, or if the operation introduces a risk to the public by operating over populated areas. ALPA asserts that since the petitioner proposes no separation capabilities to mitigate the risk of collision, the proposed operation increases the likelihood of unanticipated safety impacts to an already burdened NAS. ALPA also states that there must be means both to ensure that the UA remains within the defined airspace and to ensure that the hazard of other aircraft intruding on the operation is mitigated.

The FAA addressed these concerns by adding operating conditions and limitations regarding operations in the proximity of airports. The UA may not operate within 5 nautical miles of an airport reference point as denoted on a current FAA-published aeronautical chart unless a letter of agreement with that airport's management is obtained, and the operation is conducted in accordance with a NOTAM as required by the operator's Certificate of Waiver or Authorization (COA). Additionally, stand-off distance from clouds, altitude restrictions, and operating distance from non-participating personnel have been prescribed. Further detail is contained in the analysis of the UAS operating parameters below.

An individual commented that UAS should meet criteria set forth in a standard approved by the FAA. Also, ALPA commented that Communication and Command (C2) [Note: Typically referred to as command and control] link failures are one of the most common failures on UAS and lost link mitigations require safe modes to prevent fly-a-ways or other scenarios, including mitigations such as, auto-land, return-to-home and geo-fencing boundary protection, incorporated into the navigation and control systems for a UA to safely land or re-establish C2.

ALPA further stated that the radio frequency spectrum that is commonly accessed for small UAS is unprotected and asserts that mitigations for spectrum interference, weather, terrain and obstacles (man-made or natural) should be developed to ensure safe operations.

The FAA agrees and carefully examined the proposed operation to ensure that the vehicle design and the petitioner's supporting documentation addressed potential hazards related to C2 failure. The FAA finds that the UAS to be operated by the petitioner has sufficient design features to address these hazards. As discussed in the analysis of the UAS below, the Secretary of Transportation has determined that the UAS and associated operations proposed in the petition meet the criteria of Section 333 and thus design standards are not required. Further detail is contained in the analysis of the UAS below.

Regarding 14 CFR § 91.113 Right of Way, "See and Avoid" requirements, ALPA also stated that given the absence of an onboard pilot, a means to meet this statutory requirement is necessary. The FAA shares these concerns and has incorporated associated conditions and limitations into this exemption, including: a) NOTAMs issued for all operations, b) operations conducted within VLOS of the PIC and the VO, and c) the UAS PIC must always yield right-of-way to manned aircraft.

The FAA's analysis is as follows:

Unmanned Aircraft System (UAS)

The petitioner requested relief from 14 CFR part 21, Certification procedures for products and parts. In accordance with the statutory criteria provided in Section 333 of P.L. 112-95 in reference to 49 USC § 44704, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that the requested relief from 14 CFR part 21, and any associated noise certification and testing requirements of part 36, is not necessary.

Commercial motion picture and television aerial filming operations with manned aircraft are typically conducted with aircraft holding standard airworthiness certificates issued under Part 21, subpart H. These aircraft are normally modified via the Supplemental Type Certificate (STC) process to install cameras and other equipment not included in the original aircraft design.

Manned helicopters conducting motion picture and television aerial filming can weigh 6,000 lbs. or more and are operated by an onboard pilot, in addition to other onboard crewmembers, as necessary. The petitioner's UA will weigh less than 55 lbs. with no onboard pilot or crew. The pilot and crew will be remotely located from the aircraft. The limited weight significantly reduces the potential for harm to participating and nonparticipating individuals or property in the event of an incident or accident. The risk to an onboard pilot and crew during an incident or accident is eliminated with the use of a UA for the aerial filming operation.

Manned aircraft are at risk of fuel spillage and fire in the event of an incident or accident. The UA carries no fuel, and therefore the risk of fire following an incident or accident due to fuel

spillage is eliminated.

During motion picture and television aerial filming with manned aircraft under the conditions of an FAA issued Certificate of Waiver, normally issued by a jurisdictional Flight Standards District Office (FSDO) under FAA Order 8900.1 V3, C8, S1, aircraft can be operated in very close proximity to participating persons. The safety of these individuals is maintained through use of an aircraft with standard airworthiness certification under 14 CFR part 21, Subpart H, operation of the aircraft by a qualified and competent pilot, and operating according to limitations necessary to ensure safety. In these situations, the filming subject and production personnel are exposed to risk by virtue of their close proximity to an aircraft in flight. Compared to manned aircraft, the UA being operated by the petitioner reduces the risk to participating persons in close proximity to the aircraft due to the limited size, weight, operating conditions, and design safety features of the UAS.

This exemption does not require an electronic means to monitor and communicate with other aircraft, such as transponders or sense and avoid technology. Rather the FAA is mitigating the risk of these operations by placing limits on altitude, requiring stand-off distance from clouds, permitting daytime operations only, and requiring that the UA be operated within visual line of sight and yield right of way to all manned operations. Additionally, the exemption provides that the operator will request a NOTAM prior to operations to alert other users of the NAS.

The petitioner's UAS has the capability to operate safely after experiencing certain in-flight failures. The UA is also able to respond to a lost-link event with a pre-coordinated, predictable, automated flight maneuver. The FAA also believes that the multiple control redundancies described in the petitioner's operating documents are sufficient to mitigate risks associated with the loss of GPS signal. These additional safety features ensure that these operations will not adversely impact the safety of participating and nonparticipating individuals.

Regarding the petitioner's requested relief from 14 CFR § 45.23(b) *Display of marks*, the petitioner's request is made under the assumption that marking with the word "experimental" will be required as a condition of an exemption request. However, this marking is reserved for aircraft that are issued experimental certificates under § 21.191. Since the petitioner's UAS will not be certificated under 14 CFR § 21.191, a grant of exemption for 14 CFR § 45.23(b) is not necessary.

The petitioner requests relief from 14 CFR §§ 91.405(a) *Maintenance required*, 91.407(a)(1) O*peration after maintenance, preventive maintenance, rebuilding, or alteration*, 91.409(a)(2) *Inspections*, and 91.417(a) and (b) *Maintenance records*. The FAA has evaluated the petitioner's request and determined that cause for exemption to these requirements is warranted. The FAA notes that the petitioner's operating documents contain preflight and postflight checks for the UAS. The FAA has also determined that relief from § 91.409(a)(1) is also necessary because it is an alternate inspection requirement of § 91.409(a)(2).The FAA finds that adherence to the operating documents, as required by the conditions and limitations below, is sufficient to ensure that safety is not adversely affected.

Pilot In Command of the UAS

Regarding the petitioner's requested relief from 14 CFR § 61.113(a) and (b) *Private pilot privileges and limitations*, the petitioner requested regulatory relief to operate its UAS without an FAA-certificated pilot. Although Section 333 provides limited statutory flexibility to the statutory requirement to hold an airworthiness certificate, it does not provide flexibility to other requirements of title 49. The FAA does not possess the authority to exempt from the statutory requirement to hold an airman certificate, as prescribed in 49 USC § 44711. For further information see Exemption No. 11110, Trimble Navigation, Ltd.

The FAA is requiring a pilot certificate for UAS operations for two reasons, the first of which is to satisfy the statutory requirements as stated above. The second is because pilots holding an FAA issued private or commercial pilot certificate are subject to the security screening by the Department of Homeland Security that certificated airmen undergo. As previously determined by the Secretary, the requirement to have an airman certificate ameliorates security concerns over civil UAS operations conducted in accordance with Section 333.

Given these grounds, the FAA must determine the appropriate level of pilot certification for the petitioner's proposed operation.

Under 14 CFR part 61, civil operations for compensation or hire require a pilot that holds a commercial pilot certificate. Based on the limitations of 14 CFR § 61.113(a) and (b), a pilot holding a private pilot certificate cannot act as a PIC of an aircraft for compensation or hire unless the flight is only incidental to a business or employment. However, in Grant of Exemption No. 11062 to Astraeus Aerial (Astraeus), the FAA determined that a PIC with a private pilot certificate operating the Astraeus UAS would not adversely affect operations in the NAS or present a hazard to persons or property on the ground.

The FAA has analyzed the petitioner's proposed operation and has determined that it does not differ significantly from the situation described in Grant of Exemption No. 11062 to Astraeus. The petitioner plans to operate over property with the permission of the land owner/controller while also limiting access to the property during operations. Given: 1) the similar nature of the petitioner's proposed operating environment to that of Astraeus, 2) the parallel nature of private pilot aeronautical knowledge requirements to those of commercial requirements, and 3) the airmanship skills necessary to operate the UAS, the FAA finds that the additional manned airmanship experience of a commercially certificated pilot would not correlate to the airmanship skills necessary for the petitioner's proposed operations. Therefore, the FAA finds that a PIC holding a private pilot certificate and a third-class airman medical certificate is appropriate for the proposed operations.

With regard to the airmanship skills necessary to operate the UAS, the petitioner has proposed pilot qualification criteria and a training program. The conditions and limitations below stipulate that the petitioner may not permit any PIC to operate unless that PIC has completed the petitioner's training program, meets the operator's pilot qualification criteria and demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and

maintaining appropriate distances from persons, vessels, vehicles and structures.

The petitioner also requested that a *pilot at the controls* [referred to as a PAC by the petitioner], who does not possess at least a private pilot certificate, could also be designated and manipulate the controls under the authority of the PIC. The FAA does not agree. The petitioner has not provided sufficient information to consider operations in close proximity to persons and property without a certificated airman. All operations must be conducted by a PIC that meets the qualifications described above and the conditions and limitations below.

In conclusion, the FAA finds that a PIC holding a private pilot certificate and a third-class airman medical certificate, meets the petitioner's pilot qualification criteria and has completed the petitioner's UAS training, can conduct the proposed UAS operations without adversely affecting the safety of the NAS and persons or property on the ground. Upon consideration of the overall safety case presented by the petitioner and the concerns of the commenters, the FAA finds that granting limited relief from 14 CFR § 61.113(a) and (b), is warranted.

The petitioner has also indicated it will supplement its proposed operation(s) with a visual observer (VO) who has completed the petitioners training program. The conditions and limitations below stipulate that the PIC must ensure that the VO can perform the functions prescribed in the operating documents. Additionally, as discussed in Exemption No. 11109 to Clayco, Inc., there are no regulatory requirements for VO medical certificates. A medical certificate is not required for a VO. The VO and PIC must have the ability to maintain VLOS with the UA at all times. It is the responsibility of the PIC to be aware of the VO's visual limitations and limit operations of the UA to distances within the visual capabilities of both the PIC and VO. Moreover, the VO will not be operating the aircraft. Therefore, as in Grant of Exemption No. 11062 to Astraeus, the FAA does not consider a medical certificate necessary for the VO.

Operating parameters of the UAS

Based upon its assessment of the proposed operations, the FAA has determined that notification and coordination with jurisdictional FSDOs similar to the requirements prescribed in FAA Order 8900.1, Volume 3, Chapter 8, Section 1 (V3, C8, S1), *Issue a Certificate of Waiver for Motion Picture and Television Filming*, is necessary, as required in Exemption No. 11062 to Astraeus, including submitting a written Plan of Activities. Motion picture and television filming waivers similar to the petitioner's operation are normally issued from one jurisdictional FSDO and can be used in locations covered by other geographically responsible FSDOs through notification. Since the petitioner's operation deals specifically with UAS, this exemption will take the place of the Certificate of Waiver normally issued by a jurisdictional FSDO under FAA Order 8900.1 V3, C8, S1 (Note: this should not be confused with the COA issued by the FAA Air Traffic Organization as discussed below and in the conditions and limitations). Every FSDO with jurisdiction over the area that the petitioner plans to operate within must still be notified, just as with manned filming operations, and those FSDOs will have the ability to coordinate with the UAS Integration Office to address any local concerns, as stated below in the conditions and limitations section of this exemption.

The petitioner requested relief from 14 CFR § 91.7(a) *Civil aircraft airworthiness* and the FAA finds that relief from § 91.7(a) is necessary. While the petitioner's UAS will not require an airworthiness certificate in accordance with 14 CFR part 21, Subpart H, the FAA considers the petitioner's compliance with its operating documents to be a sufficient means for determining an airworthy condition. Therefore, relief from § 91.7(a) is granted. The petitioner is still required to ensure that its aircraft is in an airworthy condition – based on compliance with the operating documents prior to every flight, and as stated in the conditions and limitations below.

Additionally, in accordance with 14 CFR § 91.7(b), the PIC of the UAS is responsible for determining whether the aircraft is in a condition for safe flight. The FAA finds that the PIC can comply with this requirement, therefore relief from § 91.7(b) is not necessary.

Regarding the petitioner's requested relief from 14 CFR § 91.9 *Civil aircraft flight manual, marking, and placard requirements* and 14 CFR § 91.203(a) and (b) *Civil aircraft: Certifications required*, the FAA has previously determined in Grant of Exemption 11062, Astraeus Aerial, that relief from these sections is not necessary. Relevant materials may be kept in a location accessible to the PIC in compliance with the regulations.

Regarding the petitioner's requested relief from 14 CFR § 91.103, *Preflight Action*, the petitioner requires each PIC to take certain actions before flight to ensure the safety of the flight. The exemption is needed because the pilot will take separate preflight actions as referenced in the operating documents. Although there will be no approved Airplane or Rotorcraft Flight Manual available, the FAA believes that the petitioner can comply with the other applicable requirements in 14 CFR § 91.103(b)(2). The procedures outlined in the operating documents address the FAA's concerns regarding compliance with § 91.103(b). The PIC will take all actions including reviewing weather, flight battery requirements, landings, and takeoff distances and aircraft performance data before initiation of flight. The FAA has imposed stricter requirements with regard to visibility and distance from clouds; this is to both keep the UA from departing the VLOS and to preclude the UA from operating in the NAS. The FAA also notes the risks associated with sun glare; the FAA believes that the PIC's and VO's ability to still see other air traffic, combined with the PIC's ability to initiate a return-to-home sequence, are sufficient mitigations in this respect. The PIC will also account for all relevant site-specific conditions in his or her preflight procedures. Therefore, the FAA finds that exemption from 14 CFR § 91.103 is not necessary.

Although the petition requests relief from 14 CFR § 91.109, *Flight instruction; Simulated instrument flight and certain flight tests*, it did not include supporting rationale or basis for such relief. However, as in Grant of Exemption Number 11138 (Douglas Trudeau, Realtor), the FAA has determined that relief is not necessary since the petitioner has not presented operations requiring a full-functioning dual set of controls.

The petitioner requested relief from 14 CFR § 91.119, *Minimum safe altitudes*. Relief from § 91.119(a), which requires operating at an altitude that allows a safe emergency landing if a power unit fails, is not granted. The FAA expects the petitioner to be able to perform an emergency landing without undue hazard to persons or property on the surface if a power unit

fails. Relief from 14 CFR § 91.119(b), operation over congested areas, is not applicable, because the petitioner states that operations will only be conducted within the sterile area described in the operating documents.

The FAA finds that relief is only needed from 14 CFR § 91.119(c), which is consistent with the relief typically provided to manned operations in FAA Order 8900.1 V3, C8, S1. This Order allows for relief from § 91.119(c) with respect to those participating persons, vehicles, and structures directly involved in the performance of the actual filming. Consistent with FAA Order 8900.1 V3, C8, S1, persons other than participating persons[2] are not allowed within 500 feet of the operating area. This provision may be reduced to no less than 200 feet if an equivalent level of safety can be achieved and the Administrator has approved it. For example, an equivalent level of safety may be determined through evaluation by an aviation safety inspector of the filming production area to note terrain features, obstructions, buildings, etc. Such barriers may protect nonparticipating persons (observers, the public, news media, etc.) from debris in the event of an accident. The stand-off distances above are applicable to all UA operations, including takeoff, flight, and landing of the UA.

Regarding the petitioner's requested relief from 14 CFR § 91.121 *Altimeter Settings*, the UAS will not have a typical barometric altimeter onboard the aircraft rather it uses information generated from GPS to transmit altitude information to the PIC. As stated in the conditions and limitations below, the FAA requires any altitude reported to ATC to be in feet AGL. The petitioner may choose to set the GPS altitude indicator to zero feet AGL rather than local barometric pressure or field altitude before flight. Considering the limited altitude of the proposed operations, relief from 14 CFR § 91.121 is granted to the extent necessary to comply with the applicable conditions and limitations stated below.

Regarding the petitioner's requested relief from 14 CFR § 91.151(a) *Fuel requirements for flight in VFR conditions*, relief has been granted for manned aircraft to operate at less than the minimums prescribed in 14 CFR § 91.151(a), including Exemption Nos. 2689, 5745, and 10650. In addition, similar UAS-specific relief has been granted in Exemption Nos. 8811, 10808, and 10673 for daytime, Visual Flight Rules (VFR) conditions. The petitioner states that its UAS operations will be conducted in a controlled, closed-set filming environment, with UA under 55 pounds, at speeds below 50 knots, and within VLOS. These factors, combined with the petitioner's stated intention to land with 25% battery power remaining provides the FAA sufficient reason to grant the relief from 14 CFR § 91.151(a) as requested in accordance with the conditions and limitations below.

In evaluating the petitioner's proposed operating parameters with regard to VLOS and a safe operating perimeter, the FAA considered operations from a moving device or vehicle. Since the petitioner did not discuss provisions for these circumstances, the conditions and limitations below preclude operations from moving devices or vehicles.

[2] Per Order 8900.1 V3, C8, S1, participating persons are all persons associated with the filming production, and they must be briefed on the potential risk of the proposed flight operation(s) and must acknowledge and accept those risks. Nonparticipating persons are the public, spectators, media, etc., not associated with the filming production.

Regarding an Air Traffic Organization (ATO) issued COA, the majority of current UAS operations occurring in the NAS are being coordinated through ATC by the issuance of a COA. This is an existing process that not only makes local ATC facilities aware of UAS operations, but also provides ATC the ability to consider airspace issues that are unique to UAS operations. The COA will require the operator to request a NOTAM, which is the mechanism for alerting other users of the NAS to the UAS activities being conducted. The conditions and limitations below prescribe the requirement for the petitioner to obtain an ATO-issued COA.

Public Interest

The FAA finds that this grant of exemption is in the public interest. The enhanced safety achieved using a UA with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

The table below summarizes the FAA's determinations regarding regulatory relief:

Relief considered (14 CFR)	**FAA determination (14 CFR)**
Part 21	Relief not necessary
45.23(b)	Relief not necessary
61.113(a) and (b)	Relief granted with conditions and limitations
91.7(a)	Relief granted with conditions and limitations
91.9(b)(2)	Relief not necessary
91.103(b)	Relief not necessary
91.109	Relief not necessary
91.119	Paragraph (c) relief granted with conditions and limitations
91.121	Relief granted with conditions and limitations
91.151(a)	Relief granted from 91.151(a)(1), day, with conditions and limitations
91.203(a) and (b)	Relief not necessary
91.405(a)	Relief granted with conditions and limitations
91.407(a)(1)	Relief granted with conditions and limitations
91.409(a)(1) and (2)	Relief granted with conditions and limitations
91.417(a) and (b)	Relief granted with conditions and limitations

The FAA's Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. §§ 106(f), 40113, and 44701, delegated to me by the Administrator, AeroCine is granted an exemption from 14 CFR §§ 61.113(a) and (b); 91.7(a); 91.119(c); 91.121; 91.151(a)(1); 91.405(a); 91.407(a)(1); 91.409(a)(1) and (2); and 91.417(a) and (b) to the extent necessary to allow AeroCine to operate unmanned aircraft systems (UAS) for the purpose of aerial cinematography for the motion picture and television industry. This exemption is subject to the conditions and limitations listed below.

Conditions and Limitations

Relative to this grant of exemption, AeroCine is hereafter referred to as the operator.

The petition and the following supporting documentation are hereinafter referred to as the operating documents:

1) AeroCine Technical Manual v2
2) AeroCine General Operations Manual v 10.7.2014
3) AeroCine Battery Safety Manual
4) KW X12 Inspection Checklist
5) Maintenance Log

Failure to comply with any of the conditions and limitations of this grant of exemption will be grounds for the immediate suspension or rescission of this exemption.

1. Operations authorized by this grant of exemption are limited to the following aircraft described in the operating documents which is an unmanned aircraft (UA) that has twelve counter-rotating propellers and twelve motors in a hexacopter configuration (X12) weighing less than 55 pounds fully loaded: AeroCine Kopterworx Hammer X12 UAS aircraft variant, serial #KW-0127 onward. Proposed operations of any other aircraft will require a new petition or a petition to amend this grant.

2. UAS operations under this exemption are limited to conducting operations for the purpose of aerial cinematography for the motion picture and television industry.

3. The UA may not be flown at a ground speed exceeding 50 knots.

4. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL), as indicated by the procedures specified in the operating documents. All altitudes reported to ATC must be in feet AGL.

5. The UA must be operated within visual line of sight (VLOS) of the pilot in command (PIC) at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate.

6. All operations must utilize a visual observer (VO). The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times. Electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the functions prescribed in the operating documents.

7. The operating documents and this grant of exemption must be accessible during UAS operations and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents, the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operating documents. The operator may update or revise its operating documents. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator upon request. The operator must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption. If the operator determines that any update or revision would affect the basis upon which the FAA granted this exemption, then the operator must petition for amendment to its grant of exemption. The FAA's UAS Integration Office (AFS-80) may be contacted if questions arise regarding updates or revisions to the operating documents.

8. Prior to each flight the PIC must inspect the UAS to ensure it is in a condition for safe flight. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight. The Ground Control Station must be included in the preflight inspection. All maintenance and alterations must be properly documented in the aircraft records. The operator's authorized service technicians must receive and document training referenced in the operating documents.

9. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics, e.g. replacement of a flight critical component, must undergo a functional test flight. The PIC who conducts the functional test flight must make an entry in the aircraft records.

10. The pre-flight inspection must account for all potential discrepancies, e.g. inoperable components, items, or equipment, not already covered in the relevant sections of the operating documents.

11. The operator must follow the UAS manufacturer's aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements.

12. The operator must carry out its maintenance, inspections, and record keeping requirements, in accordance with the operating documents. Maintenance, inspection, and alterations must be noted in the aircraft records, including total flight hours, description of work accomplished, and the signature of the authorized person returning the UAS to service.

13. Each UAS operated under this exemption must comply with all manufacturer Safety Bulletins.

14. The authorized person must make an entry in the aircraft record of the corrective action taken against discrepancies discovered between inspections.

15. The PIC must possess at least a private pilot certificate and at least a current third-class medical certificate. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

16. The operator may not permit any PIC to operate unless the PIC meets the operator's qualification criteria, completes the operator's UAS training, and demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. The UAS may not be operated by a PAC or other person who does not meet the requirements above. The VO is also required to complete the operator's training requirements. A record of training must be documented and made available upon request by the Administrator. Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building), are permitted under the terms of this exemption. However, training operations may only be conducted during dedicated training sessions.

17. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.

18. The UA may not operate within 5 nautical miles of an airport reference point as denoted on a current FAA-published aeronautical chart unless a letter of agreement with that airport's management is obtained, and the operation is conducted in accordance with a NOTAM as required by the operator's COA. The letter of agreement with the airport management must be made available to the Administrator upon request.

19. The UA may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.

20. If the UA loses communications or loses its GPS signal, it must return to a pre-determined location within the planned operating area and land or be recovered in accordance with the operating documents.

21. The PIC must abort the flight in the event of unpredicted obstacles or emergencies in accordance with the operating documents.

22. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough power to fly at normal cruising speed to the intended landing point and land the UA with 25% battery power remaining.

23. The operator must obtain an Air Traffic Organization (ATO) issued Certificate of Waiver or Authorization (COA) prior to conducting any operations under this grant of exemption. This COA will also require the operator to request a Notice to Airman (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to the operation.

24. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification (N-Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.

25. Before conducting operations, the radio frequency spectrum used for operation and control of the UA must comply with the Federal Communications Commission (FCC) or other appropriate government oversight agency requirements.

26. The documents required under 14 CFR §§ 91.9 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the UAS is operating. These documents must be made available to the Administrator or any law enforcement official upon request.

27. At least three days before scheduled filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local FSDO with jurisdiction over the area of proposed filming. The 3-day notification may be waived with the concurrence of the FSDO. The plan of activities must include at least the following:

    a. Dates and times for all flights;

    b. Name and phone number of the operator for the UAS filming production conducted under this grant of exemption;

    c. Name and phone number of the person responsible for the on-scene operation of the UAS;

    d. Make, model, and serial or N-number of UAS to be used;

    e. Name and certificate number of UAS PICs involved in the filming production event;

    f. A statement that the operator has obtained permission from property owners and/or local officials to conduct the filming production event; the list of those who gave permission must be made available to the inspector upon request;

    g. Signature of exemption-holder or representative; and

    h. A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which filming will be conducted and the altitudes essential to accomplish the operation.

28. The UA must remain clear and yield the right of way to all manned aviation operations and activities at all times.

29. The UAS may not be operated by the PIC from any moving device or vehicle.

30. The UA may not be operated over congested or densely populated areas.

31. Regarding the distance from participating persons, the operating documents have safety procedures for UA operations to be conducted closer than 500 feet to authorized and consenting production personnel. At all times, operations must not present an undue hazard to those participating persons per § 91.119(a).

32. Regarding distance from nonparticipating persons, the operator must ensure that no persons are allowed within 500 feet of the area except those consenting to be involved and necessary for the filming production. This provision may be reduced to no less than 200 feet if it would not adversely affect safety and the Administrator has approved it. For example, an equivalent level of safety may be determined by an aviation safety inspector's evaluation of the filming production area to note terrain features, obstructions, buildings, safety barriers, etc. Such barriers may protect nonparticipating persons (observers, the public, news media, etc.) from debris in the event of an accident. This is also consistent with the FAA Order 8900.1, V3, C8, S1.

33. All operations shall be conducted over private or controlled-access property with permission from the land owner/controller or authorized representative. Permission from the land owner/controller or authorized representative will be obtained for each flight to be conducted.

34. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS-80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: www.ntsb.gov.

This exemption terminates on January 31, 2017, unless sooner superseded or rescinded.

Issued in Washington, DC, on January 23, 2015.

/s/

John Barbagallo
Acting Deputy Director, Flight Standards Service